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ABSTRACT

To explore the effects of the use of sign language as an intervention technique to facilitate the development of expressive and receptive communication skills, manual sign language (Signing Exact English) was employed with 12 multihandicapped, language delayed and/or nonverbal Ss (18 to 36 months old). Sign language was studied both as a facilitator of oral communication and as an intervention technique. Intervention procedures were structured to provide a naturalistic cue and consequence communication learning environment in the form of snack time language-food exchanges. To stimulate requests in sign language, the children were initially prompted. Prompts initiated by the teacher were soon faded. At the end of the training program, the number of vocalizations and signs emitted by each child was tabulated. Six of the children learned more than three signs and four of the children were able to vocalize in sentences. None of these children was able to vocalize sentences at the beginning of the study. Data on successful and unsuccessful learners were compared in terms of motor involvement, diagnostic categories, developmental ages, and developmental theory. It was concluded that early language intervention programs can be matched to children's needs even with severely impaired and language delayed children. (Author/SBH)

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MANUAL SIGNING: A COMMUNICATION TOOL FOR LANGUAGE DELAYED PRESCHOOL HEARING CHILDREN: AN EXPLORATORY STUDY (PRESENTED AT WPA, HONOLU, MAY 1980)

BY MARY ANN READ

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ABSTRACT

The use of manual sign language (Signing Exact-English), was employed with multihandicapped, language-delayed and/or non-verbal subjects who were from 18 months to 36 months old. Sign language was studied both as a facilitator of oral communication and as an intervention technique.

The participants in the study were 12 children attending a public preschool for multihandicapped children located at Casa Colina Hospital. Diagnostic labels for the handicapping conditions of the participants included Cerebral Palsy, Chromosomal Disorders, Seizure Disorders, Autistic-like Disorders and Developmental Delay.

Data collection for pre-post- measures included the: Bayley Scale of Infant Development; Receptive-Expressive Emergent Language Scale; Brekken Drouin Developmental Spot-check; and the Developmental Profile of Alpern and Boll. The average developmental age for the group was 13.3 months at pretesting.

Intervention procedures were structured to provide a naturalistic cue and consequence communication-learning environment in the form of snack time language-food exchanges. To stimulate requests in sign language, the children were initially prompted. The prompts initiated by the teacher

were faded as soon as possible.

At the end of the training program, the number of vocalizations and signs emitted by each child was tabulated. Six of the children learned more than three signs and four of these six were able to vocalize in sentences such as "I want more juice." None of these children were able to vocalize in sentences at the beginning of the study. Data on successful and unsuccessful learners are compared in terms of motor involvement, diagnostic categories, developmental ages, and developmental theory.

It is concluded that early language intervention programs can be matched to children's needs even with severely impaired and language delayed children. Areas for further investigation were described and suggested.

INTRODUCTION

The purpose of this study was to explore the effects of the use of sign language as an intervention technique to facilitate the development of expressive and receptive communication skills with multihandicapped, developmentally delayed children whose ages ranged from 18 months to 36 months. More specifically, this research addressed the following questions:

1. Did the participants acquire communication skills using signs or speech and if so, were there significant changes in their various developments?
2. Were there any significant differences between those who had been diagnosed as having a motor impairment which contributed to their handicapping condition (since the use of manual sign language can be considered to be a motor act) and those diagnosed as nonmotor involved?
3. Were there significant differences between those participants who had been diagnosed as being severely developmentally delayed and those diagnosed differently?
4. Which of the assessment measures used reflected the observable changes?

Language is one of the most important factors separating human beings from other species. Human beings identify with each other and relate to each other primarily through the medium of language. If young children do not have the tools with which to construct language, they cannot express their needs or ideas to others. Children with motor, sensory or intellectual deficits have difficulties organizing and mastering their world. The ability to organize and the ability to master are significant factors in cognitive and social development.

Children with handicaps are often more dependent on their environment for assistance with feeding, dressing, mobility and play. Because of this additional need for assistance, young children with handicaps need communication skills more than do normal children. Handicapped children need communication to organize a confusing world and to help them gain some sense of control and mastery if they are to achieve a greater degree of autonomy. Handicapped children must be able to communicate if they are to control and affect those about them.

Many professionals in the field of language and communication development feel that the only route to communication is through vocal speech and that the key to developing vocal speech is to remove other communication alternatives from the child (Ling, 1976; Mysak, 1971; Northcott, 1977). Not all authorities agree that speech is the only real medium of

communication, however (Hollis & Carrier, 1978; Reich, 1978; Schaeffer, 1978). These latter researchers hold that if a child cannot use vocal speech then he must be provided with an alternative. The child who cannot or will not communicate through speech should not be cut off from communication with others.

The human infant is completely dependent upon the care of adults. His survival and his development depend upon these adults. From the beginning the infant interacts with some expressive function in the form of reflexive-instinctual (Moerk, 1977) crying. To meet the needs of the infant, the adults must be able to discern these needs. Rudimentary forms of communication and social interaction are hereby evidenced. The infant is also born with reflexive motor movements that are necessary for survival, i.e., sucking. Growth in the infant's motor, social, communicative and cognitive development from these reflexive structures is not a continuous, simple growth process (Eisenberg, 1972; Illingworth, 1975), but a discontinuous, segmented process. Development occurs in stages or levels (Flavell, 1963; Gesell, 1940; Piaget & Inhelder, 1969) which are governed by an internal structure. These stages do not unfold automatically, but are dependent upon maturation and experience. The stages emerge in an unchanging and constant order or sequence with the earlier stages being incorporated and integrated into those stages following. The rate of development may be variable, but the sequence remains stable. Flavell (1963) de-

fines a crucial criterion for defining a given stage of development which is the integration of all the structural properties of that stage into an integrated whole. It might be reasonable to assume that a delay in language skills would hinder the child's overall development.

The importance of the early years for the development of language and communication has been well documented (Fine, 1974; Moskowitz, 1978; Schiefelbusch, 1974; Smith & Miller, 1966). Moskowitz (1978) deems it extremely important for children to exercise the language faculty. The critical language acquisition period is from birth until about three to five years (Beadle, 1974; Bruner, 1975; Bzoch & League, 1971; Chomsky, 1977; Illingworth, 1975; Moskowitz, 1978).

Language does not exist as an end in itself but as a means to the achievement of some specific social/communication function. The functions of language are directly related to the child's interactions and integration within a social world (Bates, 1969; Bates et al., 1975; Bruner, 1975; Mahoney, 1975).

A reasonable assumption might be that children can develop language and communication only if there is language and communication in their environment during the critical years of language development. Whatever communication system is prescribed, it is important that it represent both expressive and receptive communication for the child, sending signals that are easily understood by others and being able to understand easily the signals he receives. When a young

child is not able to communicate effectively, that child will, to some degree, shape the communicative behavior of those around him. The quantity and variety of efforts to communicate with the child will be reduced. Furthermore, the child may become part of an infantilization pattern which is one of the environmental blocks to growth. Therefore, if vocal speech cannot be used as a communicative modality, another option must be considered. Nothing can do more to kindle the drive to learn language and communicate than to learn some language. If the communication is easy enough for success, the child will acquire a new feeling of freedom, control and mastery. The purpose of this study is to explore the effects of the use of manual sign language as a treatment intervention for language delayed, hearing preschool children.

> Language has been given a largely structural definition by linguistics, but in order to have a psychological theory of language, the structural emphasis must be replaced by a functional one. What must an organism do in order to give evidence that it has language? (Premack, 1970, p. 107)

The definitions adhered to in this study are:

(a) Communication: a process through which one individual transmits a message to another individual who in turn understands the message transmitted within the context of social interactions;

(b) language: a method of communication consisting of the purposeful manipulation of symbols to stand for ideas, desires or events; and

(c) speech: a vocal process by which symbols are transmitted.

A language and communication intervention program that is rooted in functional (relevant) and ecological (in a natural environment) philosophy will adhere to several key concepts. Since communication is a social interaction, the first step must be to establish a social relationship. A social communicative transaction allows the child to be an active agent in the process, rather than a passive language learner. Also, the model (adult) serves as an active participant. This active participating exchange generates optimal learning when it occurs in a familiar social exchange (Lewis & Cherry, 1977; Mahoney & Weller, 1978) that is relevant (Miller & Yoder, 1972; Muma, 1978; Sosne et. al., 1979).

Moerk (1977) suggests that gestures serve the function of a valuable training tool for the acquisition of language. They serve as instruments for the transmission of information, providing opportunities to train the functions of directing and referring. Fine (1974), Hawk (1950), and Mindel and Vernon (1971) concur, stating that gesture language precedes speech and is the first step in the development of expression. In their execution, signs are closer to gestures than speech; however, by definition, gestures and signs are quite different. A gesture is defined by Markowicz (1977) as " . . . the spontaneous movement of the hands and body which expresses a concept in irregular and imprecise fashion (p. 14) . . ." Sign language is neither irregular nor imprecise. In fact, sign language is preferable to gestures because signs are

part of the symbolic function (Piaget, 1952), i.e., the ability to have a symbol represent an object or event which may not be perceptually present (Bowerman, 1974).

Sign Language Systems

Two major sign language systems exist. The first is American Sign Language, sometimes called ASL or Ameslan. It has been said that ASL is not a language but a loose collection of gestures which are strung together and lack a systematic structure. This is not the case. Also, American Sign Language is not a degenerate form of English. ASL is a complete language which utilizes signs rather than words, with the principal function of conveying concepts. The signs are equivalent to words in a spoken language and the movements are structured into signs in the same way that sounds are structured into words. American Sign Language grammar differs from English grammar, but ASL grammar and the rules for the formation of signs " . . . are as complex as those of spoken languages and . . . there are no inherent limitations on what it can express (Markowicz, 1977, p. 21)."

Because a large percentage of deaf children have had great difficulties in learning to read, it was felt that a sign system which exactly paralleled English syntax would ameliorate this problem. The second sign language system, Signing Exact English, was born out of this philosophy. The premise of the new language was that a specific sign should

mean one and only one English word and that English should be signed as it is spoken (Gustason, 1973). Both of these sign systems are mentioned in related studies. In this study, however, the term "sign language" will refer to Signing Exact English.

Summary

Many authorities in the field of language acquisition agree that it is not wise to give language delayed children an alternative or supplementary communication system (Ling, 1976; Mysak, 1971; Northcott, 1977). Others propose caution in using multi-modal input because of possible synchronization problems (Dever, 1974; Oleron, 1977). However, developmental stage theorists (Bruner, 1975; Eisenberg, 1972; Illingworth, 1975; Piaget, 1952) who adhere to the philosophy of stages or levels of development which are governed by an internal structure or set of laws note that these stages do not unfold automatically, but are dependent upon maturation and experience. Various authors emphasize the importance of early language experiences (Moerk, 1977; Muma, 1978; Schiefelbusch, 1974; Smith & Miller, 1966). Some children deprived of the typical mode of expression, i.e., speech, may benefit from an alternate approach of communication. The studies demonstrating the early use of sign language by deaf children (Bellugi & Klima, 1975; Moores, 1978; Schlesinger & Meadows, 1972), as well as studies on the use of sign language with a variety of handicapped populations (Bonvillian &

Nelson, 1976; Creedon, 1973; Lebeis & Lebeis, 1975), lend support to the possible use of manual sign language as an intervention strategy for developmentally delayed, hearing preschool children.

PROCEDURES OF RESEARCH

Setting

Participants for this study were members of a public school classroom (N=12) for multihandicapped one and a half to three year old preschoolers located in the Children's Services Center at Casa Colina Hospital in Pomona, California. The children manifested symptoms of Cerebral Palsy, Seizure Disorder, Chromosomal Disorders (including Down's Syndrome), Developmental Delay with unknown etiology, and Autistic-like behaviors. The preschool program utilized an interdisciplinary team approach, making maximum use of the skills of pediatricians, psychologists, physical therapists, speech therapists, occupational therapists, family counselors and other professionals. It sought to take maximum advantage of parent involvement. Parents participated in the classroom at least twice a month; they attended weekly parent meetings and were active participants in initial and year-end staffings.

Procedures

Intervention

The classroom utilized its normal staff and professional backup and parents and all supporting staff were aware of

the research project. Within the first month of each child's enrollment in the preschool, baseline data were recorded. Specifically, pretest measures consisted of the Bayley, which was administered by the occupational therapist; the REEL, which was administered by the speech pathologist; the BDDS, completed by the teacher and the occupational therapist; and the two Alpern and Boll scores, obtained by the family counselor from the parent and the teacher at separate times. Furthermore, the teacher recorded the number of words in each child's vocabulary with the speech therapists's collaboration.

Within the structure of the classroom, it seemed most appropriate to use the snack period to provide the heaviest focus on the use of communication. Most of the children indicated that eating and drinking were pleasurable experiences. Eating was a social time when all the children and adults were together.

At 10:00 the staff began to pick up the materials. It was announced, using sign and voice, "It is time to eat." Some children seated themselves, others were brought to the table and received help getting seated. One of the teachers then said and signed, "Get your mouth and your fingers ready." All available staff (including parents) came to help. The adults (any number from two to four) spread themselves among the children. One adult modeled and the others helped the children to sign and say "Today we are going to eat _____." Each child was then given, or helped himself to the snack item. Small quantities were served. When a child had finished his portion, an adult would ask if he wanted "more," saying and signing the word. Another adult molded the sign with the child and the child was given more. The staff knew which children needed to have the sign molded and which children needed only modeling or questioning. Once the child had learned the sign for "more," he was taught the names for the snack items. The staff could then ask the child if he wanted "cookie" or "drink." When the child began to use "more" appropriately, without prompts, he was introduced to two-word signs. If the child had good bilateral fine motor control, he was helped to sign "more cookie" or "more juice" following the model-mold procedure. The molding was dropped as soon as possible so that the child responded to the model and optimally, only to the interrogative, "What do you want?" If the child had difficulty with bilateral

control, then the same procedure was followed with the terms "more eat" and "more drink." These signs were easier to execute with one functional hand. When snack was finished and the children were ready to leave the table, an adult signed and said "down".

Any reference made to "staff" or "adults" includes parents. Parents participated in the classroom at least twice a month. Some participated more frequently. Parents were informed immediately if their child had learned a new sign. Each parent had a hand-out which described the basic signs that were used in school and others they might want to use. The parents utilized the signs in varying degrees.

To conclude, the children attended school for approximately three and a half hours, five days a week. Their parents were kept current on their child's use of words and signs. The snack period served as the structured teaching setting, while lunch time was the review period.

Materials

Six independent assessments were used to measure ongoing behavior and/or development. Two subscales of the Bayley Scales of Infant Development yield mental and motor indices that are particularly useful for children who have developmental disorders (Magrab, 1976). The mental scale is designed to assess sensory-perceptual acuities, discriminations, and the ability to respond to these; the early acquisition of

object constancy and memory, learning, and problem-solving ability; vocalizations and the beginnings of verbal communication; and early evidence of the ability to form generalizations and classifications. The motor scale measures the degree of control of the body, coordination of the large muscles and finer manipulatory skills of the hands and fingers.

Reliability studies for 90 babies using a tester-observer method indicated an 89.4 mean percentage of agreement (Bayley, 1969). The Bayley scales were administered on an individual basis by the occupational therapist.

The Brekken Drouin Development Spot Check (BDDS) is a criterion-referenced observational tool. It gives a profile of the child's functioning in gross motor, fine motor, language, social interpersonal and self-help skills, based on a developmental age score and a developmental quotient can be derived. The BDDS was administered by the classroom teacher and the occupational therapist in the classroom environment. The BDDS requires no elaborate test equipment or administration procedures. Preliminary inter-rater reliability for trained observers was .95. The degree of agreement on items that both observers scored was 92 percent.

For a multidimensional analysis of language, Bzoch and League's (1971) Receptive-Expressive Emergent Language (REEL) was administered individually by the speech therapist. Briefly, the REEL items are grouped as receptive or expressive and are scored as typical, emergent or absent. The REEL

was developed for an " . . . effective means of identifying very young children who may have specific handicaps requiring early habilitative and educational intervention . . . (Bzoch & League, 1971, p. 12)." Reliability studies on the REEL using a test-retest approach yielded from 90 to 100 percent agreement between different administrators.

The Developmental Profile of Gerald D. Alpern and Thomas J. Boll (1972) is an inventory of physical, self-help, social, academic and communication skills. As a respondent measure, the Alpern and Boll profile assesses an adult's perception of the child. This test was administered independently to both the children's parents and the classroom teacher by the family counselor.

In addition to the above developmental scales, two behavioral observation techniques were used to assess vocal behavior and manual signing. One technique was cumulative recording of each child's acquisition of words and signs. The other technique involved frequencies of occurrence of cries, gestures, words and signs during snack time for a period of two months. The observation techniques yield figures of frequency and quantity, whereas the developmental scales are recorded as mental age in months.

Total scale scores (in months) were computed for each assessment measure. The total scale scores were then averaged to arrive at an average developmental age for each child. Two multiple indicators were used: total scales and skill

area combinations. Total scales were expressed as total scale average. For example, the BDDS had six subscale scores and to arrive at a total scale score or average developmental age score, the six subscales (i.e., gross motor, fine motor, receptive language, expressive language, self-help and social interaction) were averaged. Similarly, an average developmental age score in months was computed for each of the other standardized measures. Thus, the total scale score for each measure encompassed several skill areas and reflected overall social, motor, and cognitive development.

Further, skill areas were combined in order to increase consistency on measurements which may be construed as concurrent validity. Mean age scores for specific skill areas were computed by averaging across measures the subscales that measured the same skill. For example, receptive language was measured by the Alpern and Boll academic subscales, the BDDS and REEL receptive subscales, and the Bayley mental subscales. Averaging these subscales produced a mean receptive age score. In the same manner, mean expressive language, mean social interaction, mean motor age, and mean self-help age scores were computed. Two criteria were used to determine similarity of subscales: (1) identifying label of the subscales (e.g., "receptive language"); and (2) item similarity among the subscale. Ergo, even though the "academic" subscale of the Alpern and Boll had a different identifying label than the "receptive language" subscale of the BDDS, the items of the

Alpern and Boll "academic" subscale reflected receptive language items and thus this subscale was included in the computation of the receptive language skill area scores. The receptive language, expressive language and social interaction skill areas were most pertinent in this study and therefore received the major focus of attention. The results were reported stressing these three skill areas as they relate to the delineated comparison groups.

Treatment of the Data

In order to probe the differences examined by the research questions, two statistical procedures were selected: Student's t-Test of Significant Differences Between Means and One-way Analyses of Variance (Siegel, 1956). The former method was employed when two groups were compared on any single data set; the latter used when more than two data sets were investigated with at least two groups.

Since developmental rate was viewed as having confounding potential further analyses by t-Test were implemented after the developmental age scores were adjusted for by chronological age scores at both pretesting and posttesting, i.e., an index of rate of development similar to IQ computation (MA/CA).

Limitations and Delimitations

No control group was used in this study, nor was a stratified random sample from various settings used; however,

the participants represented a cross section of multihandicapped youngsters attending preschool programs for special students. The children were used as their own controls in a pretest/posttest model.

Descriptions

In this study twelve children participated. At pretesting, the average chronological age was 26.5 months; the oldest child in the study was 41 months, and the youngest was 18 months. There were eight boys and four girls. Each child was assigned one or more diagnostic labels by a pediatrician or through previous medical reports. The modal label was Cerebral Palsy; other diagnoses included: Blindness, Hydrocelphalus, Cleft Lip and Cleft Palate, Visual Motor Deficit, Oculomotor Apraxia, Hypotonia, Cranial Asymmetry, Hemiplegia, Mosiac Chromosome Abnormality, Seizure Disorder, Down's Syndrome, Mental Retardation, and Failure to Thrive Syndrome. In addition to the diagnoses, etiologies for the children's disorders were also obtained from the medical reports. As with the diagnostic labels, multiple etiologies were identified for some children. Of the 12 participants, five had unknown etiologies, four had genetic abnormalities, and prematurity, meningitis, anemia, perinatal brain injury, retrolental fibroplasia, and environmental deprivation were each named as possible etiological factors.

The average period of participation was 8.7 months varying from 6 months to 10 months. The ethnic composition included Anglo, Hispanic, Black, Chinese and Samoan. Of these children, two had both younger and older siblings, two had only younger siblings, five had older siblings only, and three children had no siblings. Of the 12 participants, at pretest, one child used one word, one used one sign, one used four words and nine children used no signs or words.

Of the children in this study none walked, although four were just becoming ambulatory with assistance. Most of the children were able to finger feed and some were drinking from a cup. Many would engage in a one-to-one activity with an adult or explore a nearby toy, but often they did not interact spontaneously with the environment. Often the children merely cried if they needed attention; some pointed to have their needs met. The participant's average developmental age of 13.3 months was evident in their play behavior and with some in their motor development.

Formation of Comparison Groups

In the following discussion, "word" refers to vocal words and "sign" refers to signed words. This distinction is made for clarification and ease of discussion.

Four sets of comparison groups (each set including all 12 children but in different constellations) were formed. Of the four groups, two were a priori groupings (i.e., condition

severity groups and motor-involved groups) and two were *a posteriori* groupings (i.e., number of words used at posttest and number of signs used at posttest) were created to enhance the possibilities for analyses.

Results of Comparison Groups

Condition Severity Criterion Groups

Three children, two were males, were in the Severe Group. Their average developmental age at pretesting was 10.3 months, ranging from 7.2 months to 12.7 months. The Core Group included all those participants not assigned to the Severe Group. Six of the Core Group children were males and three were females; their developmental ages ranged from 11 months to 18.8 months with an average of 14.4 months at pretesting.

The Core Group progressed an average of 7.7 months more than the Severe Group in the three skill areas. Between the two groups there were significant developmental age change differences. However, the rate of development at posttest was not significantly different from the rate of development at pretest for either the Core or Severe Group. There were significant differences between the two groups at both pretesting and posttesting.

Motor Criterion Groups

The Nonmotor Invovled Group included those participants who on the basis of diagnoses and etiologies were considered not to be motor impaired. The four members of this group,

two of them females, had an average developmental age of 13.8 months, ranging from 11.9 months to 16.6 months at pretesting.

The eight participants, seven of whom were males, of the Motor Involved Group were assigned on the basis of their medical diagnoses which included a motor impairment. Their average pretest developmental age was 13.1 months, ranging from 7.2 months to 18.8 months.

Between the Motor Involved Group and the Nonmotor Involved Group, the only significant developmental age change score was on the mothers' responses to the social interaction subscale of the Alpern and Boll. Additionally, there were no significant differences in the rate of development within or between the Motor and Nonmotor Involved Groups.

Sign Criterion Groups

The six children, two females, who learned fewer than four signs were assigned to Sign Group A and had an average pretest developmental age of 13.0 months with a range from 7.2 months to 18.8 months.

There were six participants, four males and two females, who learned more than three signs and were assigned to Sign Group B. Their pretest developmental ages ranged from 11.9 months to 16.6 months with an average age of 13.7 months.

Between Sign Group A and Sign Group B there were significant differences in average developmental age change scores of the receptive and expressive language skill areas as well as other subscales on the total developmental profile.

Sign Groups

No significant differences in development rate were discovered either within or between Sign Groups.

Since the rate of development was not significantly different within or between the two Sign Groups, but there were significant differences in developmental age in all skill areas, a further analysis was conducted to examine this seemingly contradictory phenomenon. An examination of the originally classified Core Group subjects who were also classified as Sign Group A subjects was conducted. The subjects were identified by their particular pathology. A t-Test of Significant Differences Between the Mean was computed for the developmental rates of the pretest and posttest with the Sign Group A subjects. Significant differences were discovered in both pretest and posttest between those classified as Sign Group A and Core and those classified as Sign Group A and Severe.

Words Criterion Groups

Four children in the study learned no words and comprised Word Group A; they had an average developmental pretest age of 12.0 months with a range from 7.2 months to 17.4 months.

Word Group B consisted of four children who learned from one to four words and had an average pretest developmental age of 12.4 months, ranging from 11 months to 13.8 months.

Four children who learned to use sentences formed Word Group C. A sentence was defined as the sequential stringing

of three or more vocal words into one utterance. The mean developmental age at pretesting was 15.5 months with a range from 13.0 months to 18.8 months.

Significant differences in developmental age change scores were discovered between Groups A, B, and C on particular scale measurements and on the averages in receptive language and expressive language skill areas.

Word Groups

A significant difference was discovered in the development rate of those children classified into Word Group C (having learned to use sentences) between pretest and posttest. Further, a significant difference (at the .01 level of confidence) in developmental rate was found between Word Group C and Word Group B (those having learned one to three words) at posttest, but no significant differences in the developmental rate was discovered between Word Group A (those having learned no words) and Word Group C. Nor were any significant differences discovered between Word Group A and Word Group B at posttest. Since a t-Test is based upon the theory of homogeneity of variance and since the variance of Word Group A was so great, this lack of significance is thus explained. Further examination of the data by classifying subjects into condition severity as well as word acquisition groups separated those individuals in Word Group A who possessed conditions not conducive to the acquisition of oral communication (i.e., the severely impaired) and confounded

the developmental rate of Word Group A. Analysis of those subjects who were in the Core Group and Word Group A reveals no significant differences in developmental rate between pretest and posttest. However, those who were classified in the Core Group and Word Group B were significantly higher (at the .05 level of confidence) at posttest than pretest in their developmental rate. There were significant differences between those in the Core Group and Word Group A and those in the Core Group and Word Group B at pretesting (.05 level of confidence) and at posttesting (.01 level of confidence).

The Frequency of Cries and Gestures vs. Words and Signs

For a period of two months, frequency counts of cries, gestures, signs, and words were taken at the children's snack time. One trained observer recorded eight (only eight of the current participants were in the program during this period) children for a two-month period which was divided into four observation periods of two weeks each. For each participant, the number of cries, gestures, signs, and words was divided by the number of days observed; this number was then summed across all participants. Initially, gestures and cries had the highest frequencies of occurrence. Cries, gestures and words decreased for a period of time, followed by an increase in words and a decrease in cries. The frequency of gestures fluctuated most, while signs remained the most constant. However, the mean frequency of cries and gestures tended to decrease over the four observation times while the mean frequency for signs and words demonstrated an increase.

Summary of Results

Both sexes, a variety of handicapping conditions, and several ethnic groups were represented among the 12 participants in this study. They were in the program an average of 8.7 months and represented a mean developmental age of 13.3 months.

The 12 participants were stratified into four different comparison groups: Severe and Core (based on condition severity); Motor and Nonmotor Involved (based on motor impairment); Sign Group A (learned less than three signs) and Sign Group B (learned more than three signs); and Word Groups A, B, and C (learned no words, one to four words, and sentences, respectively). There were significant developmental age change differences between the Core and Severe Groups, the Sign Groups, and among the Word Groups.

When the index of developmental rate was analyzed, it was discovered that there were no significant differences in the developmental rate of the Core Group and the Severe Group (no within group differences) between pretesting and posttesting, although there were significant differences between the Severe Group and the Core Group at pretest and posttest. The rate of development within each group did not change over time.

There were no significant differences in the rate of development within or between the Motor Involved and Nonmotor

Involved Groups, or within or between the Sign Groups. Among the Word Groups, only Word Group C had a significantly higher rate of development at posttest than at pretest.

All the children but one (and he was Blind) who progressed to the use of one to four words or sentences first learned to use more than three signs. For the total group, the mean frequency of cries and gestures decreased over time, while the mean frequency of signs and words increased.

A variety of assessment measures were used in order to increase the overall validity of the measurement. From these measures, the receptive language, expressive language, and social interaction subscales were extracted for analysis. Of the assessment measures used, the BDDS reflected the most change, followed by the REEL. The Bayley reflected the least amount of change for the participants in this study.

DISCUSSION OF RESEARCH FINDINGS

Introduction

An initial assumption was that languge has a more significant role than its use for socialization (Call, 1979; Lieberman, 1975; Reed, 1971). In fact, language is used to maintain the adult care necessary for the child's survival (Moerk, 1977). Language has been evidenced to develop sequentially and be dependent upon maturity for symbolization (Bellugi & Klima, 1972; Flavell, 1963; Gesell, 1940; Piaget & Inhelder, 1969; Slobin, 1972). It is chronically evident that chronological age has been used to indicate developmental evidence for symbolization. This factor, without the consideration of etiological and/or pathological influences, is but an indicator of developmental age. Further, the particular etiology or pathology may have influence on the developmental rate; however, a particular diagnosis may not determine the ability to acquire expressive symbols (Bellugi & Klima, 1975; Bonvillan & Nelson, 1976; Bricker, 1972; Casey, 1978; Creedon, 1973, 1976; Deich & Hodges, 1975; Grinnell et. al., 1976; Hobson & Duncan, 1979; Hughes, 1975; Lebeis & Lebeis, 1975; McNaughton & Kates, 1975; Moores, 1978; Offir, 1976; Schaeffer, in press; Schlesinger & Meadows, 1972; Stokoe, 1975; Vanderheiden & Grilley, 1975). These factors

were a concern in this presentation.

Restated, the sample being studied consisted of 12 subjects having various and sometimes multiple etiologies. The study was conducted in the relatively natural setting of snack time at a local preschool whose purpose was to serve the handicapped. Within these conditions, using various rewards, the 12 children were encouraged to use signs to express their nutritive needs. The purpose of the study eventuated into examining differences between children who learned to communicate with signs and those who learned to communicate with vocal speech with concern about which instruments conveyed the observable changes.

All of the Sign Group B children who had learned more than three signs progressed to the use of words and some progressed to the use of sentences, while none of the children who used zero words had progressed beyond three signs. It seems reasonable to assume that the signs did not inhibit the production of speech for these children as implied by various authors (Ling, 1976; Mysak, 1971; Northcott, 1977); in fact it might be safe to speculate that the signs served as a catalyst for speech development for these children which agrees with the specific findings in other research (Bonvillan & Nelson, 1976; Creedon, 1973, 1976; Grinell et al., 1976; Lebeis & Lebeis, 1976; Schaeffer, in press). This is further supported by the analyses of the rate of development which indicated that those children who learned to use sentences (all used signs first) and those who were not in the

Severe Group and learned to use more than three signs had a significantly higher rate of development at posttesting than at pretesting.

Skill Development Within Groups

Severe Group. The Severe Group was delimited by condition severity based on medical reports, pretest data, and observation. The participants within this group had a mean chronological age of 29 months and a mean developmental age of 10.2 months at pretest. They were in the program from six to nine months and showed a total developmental gain of 1.12 months which was not significant. The three children of this group learned less than three signs and one child reportedly learned one word; the other two learned no words. Perhaps it was an accidental motor act which was rewarded and therefore repeated as suggested by Piaget (1952); perhaps this child was truly capable of using a one-word utterance as evidenced by his use of one sign; perhaps the assessment measures were inaccurate and did not reflect this child's greater capacity for language acquisition.

Of the other two children who learned to use fewer than three signs it can be stated that these children interacted in prelanguage, give and take (Bates et al., 1975; Call, 1975) activities with an adult which are prerequisites for language acquisition. Or, one might suggest that their use of minimum signs was a splinter skill which the children learned to use within the snack-time environment.

The rate of development for these participants did not change significantly within the group from the pretest to the posttest. The developmental rate of the Severe Group was significantly lower than that of the Core Group at both the pretesting and posttesting. It can possibly be said that those children who were classified as being severely impaired had an index of rate of development which attributed to their inability to acquire increased communication skills. No generalized assumptions were generated from the research data. The behavioral observations must stand alone; three children who were severely handicapped learned to use one or two signs consistently within a delineated and structured environment.

Core Group. The Core Group included the nine children who were not included in the Severe Group. They had a mean chronological age of 22 months and a mean developmental age of 14.4 months at pretesting. The Core Group participated in the program from six to ten months and made significant developmental gains in all the skill areas. The group's average total developmental age gain was 8.8 months. Six of the participants learned to use more than three signs; of these, three progressed to the use of sentences and the other three learned from one to four words. Another child who was diagnosed as Blind learned only one sign but also progressed on to vocal sentences. Behavioral observations evidence the progression from signed words to vocal words and sentences. This premise is consistent with that of Hollis and Carrier

(1978), Schaeffer (1978), and others who postulate the provision of alternatives to speech to perform the linguistic functions which the children cannot yet perform vocally, as well as Bruner (1975), Bzoch and League (1971) and others who stress the importance of a language environment in the early years of development.

The Core Group demonstrated significantly higher developmental age gains than the Severe Group since both groups learned according to their developmental rate and the index of rate of development for the Core Group was significantly higher than that of the Severe Group. Further, within the Core Group, there was no significant increase in the rate of development from pretest to posttest.

Since all subjects of the investigation were either in the Severe Group or Core Group, the references cited were considered applicable to the other groups or divisions subsumed within the classification scheme.

Interrelationships Among Groups

All three of the children in the Severe Group were motor involved. In the Core Group, five participants had motor involvement and four did not. Of those who were motor impaired, three learned to use sentences and of those, two had learned to use more than three signs. The other two children who were motor involved learned less than three signs. Of these, one child should have been included in the Severe Group at

the beginning of the study and the other child was later diagnosed as being aphasic (having a language processing problem). All four of the Nonmotor Involved Group learned to use more than three signs and of those, three used one to four words and one began to use sentences. From these observations it appears that even children with motor impairments can learn to use signs. Except for those children who were severely handicapped, there were almost no differences among those who were motor involved and learned to communicate with signs or words and those who were not motor involved and learned to communicate with signs. This assumption is supported by the lack of significant differences between the two motor groups except for the Social interaction subscale of the Alpern and Boll (teacher's response). Additionally, when the index of rate of development was analyzed, no significant differences were found in the developmental rate within or between groups at pretest or posttest.

Between the sign groups there were significantly higher mean developmental ages in Sign Group B (those who learned more than three signs) than in Sign Group A (those who learned fewer than three signs). This increase in developmental age was evidenced in all the receptive language and expressive language subscales, but only in two of the three subscales of Social interaction. It appears that the Alpern and Boll (teacher's response) of Social interaction did not significantly increase with the acquisition of signs. This

may be attributed to the nature of the assessment measure since the classroom scale indicated a highly significant increase in Social interaction for Sign Group B.

Among the Word Groups, Word Group C (those who learned to use sentences), all subscales of all the assessment measures except the Mental Scale of the Bayley, indicated significantly increased mean developmental ages in the areas of receptive language and expressive language. Only the BDDS Social interaction subscale yielded a significant increase in mean developmental age for Word Group C. Neither the Alpern and Boll, mothers' responses nor teacher's responses, noted any significant changes in mean developmental age in the Social interaction skill area. Perhaps this can be attributed to the lack of sensitivity of the assessment measure, or perhaps children's acquisition of oral skills do not relate to any change in their Social interaction skills.

From these data we may be able to conclude that those children who acquired communication skills (signs or words) and were not severely impaired demonstrated significantly higher mean developmental ages in the language skill areas, a significantly higher rate of development, but not necessarily a signficantly higher mean developmental age in Social interaction skills than those who did not acquire more than three signs or the use of oral sentences.

Characteristics Across Groups

All the groups were respresented by both sexes. There appeared to be no particular diagnosis or etiology which responded most readily to the acquisition of signs or words. Only the degree of severity of the condition made a significant difference. This finding is consistent with the literature which discusses the use of manual sign language with a variety of populations, i.e.: deaf (Bellugi & Klima, 1975; Moores, 1978; Schlesinger & Meadows, 1972); autistic (Bonvillan & Nelson, 1976; Casey, 1978; Creedon, 1973, 1976; Offir, 1976; Schaeffer, in press); Mentally Retarded (Bricker, 1972; Grinell et al., 1976; Hobson & Duncan, 1979; Lebeis & Lebeis, 1975); and aphasic (Hughes, 1975). The exploration of the population in this study has yielded the premise that developmental age, developmental rate and condition severity may be the determining factors for the acquisition of signs and words within a language environment. This concept was advanced by Bates et al. (1975), Call (1979), and Piaget (1952) in their discussions of normal language acquisition.

Discussion of Assessment Sensitivity

A consideration of the consistency and truthfulness of assessment procedures are viewed of critical value since those who deal with the results tend to treat the one assessed from this confounded perspective. The adults who

relate to that child should have accurate perceptions so that child's capacities for optimal interaction to occur.

In this study, the teacher's initial assessments were much lower than the mothers' responses to the Alpern and Boll instrument. At the time of pretesting, the mothers' responses to the Alpern and Boll were significantly higher than the teacher's in the expressive and receptive language subscale scores as well as the total scale score. These differences of perception at the beginning of the program may be due to the parents' closer relationship to the children, or the differences on the pretest scores might reflect the children's incomplete adjustment to a school program. At the time of the posttest, however, there was much less difference between the parents' and teacher's assessments in these categories. The differences might also be explained by the parents' increased sophistication about their children's abilities at the conclusion of the school year, or it may be a combination of the above possibilities. As all of the subjects and the significant change scores are examined, it must be noted, however, that the most significant changes were recorded not by the parents' responses, but by all the measures which required the input of all the professionals involved with the child. Perhaps this occurred because the professionals' assessments were initially too low. The teacher's responses to the Alpern and Boll, the BDDS, the Bayley and the REEL, all indicated significant changes between pre and posttest

scores on the total scale scores, including all the subscale scores. The various measures were administered by different examiners and the results of each test were not available to other assessors.

In a comparison of measures used, the Bayley reflected the least amount of change. The Bayley was chosen as an assessment measure for the study because of its wide-spread use with young children (Magrab, 1976). However, the results of this study suggest that the Bayley may not be the most useful tool for children with handicaps, specifically, language and communication handicaps. The REEL, which is also widely used and specifically addresses language development, reflected changes that more closely resembled the other measures used. The BDDS, which was designed as a classroom observation tool, was administered by the Occupational Therapist and the classroom teacher. It seems reasonable to assume that a measure designed for classroom use might yield higher scores in a classroom setting than measures standardized in another mileu. It could be argued that teacher bias boosted the scores on the BDDS even though the BDDS assessments were completed by a team of teacher and Occupational Therapist. In considering this argument, it must also be noted that at posttest there were significant developmental age gain differences between the mother and teacher in response to the Alpern and Boll. Again, this could be due to the professionals' inability to accurately judge a child's

level of competence at the beginning of a new program. It might be reasonable to suggest that the higher scores at posttest on the BDDS were due to the focus of the tool rather than teacher bias, since at pretest, the BDDS reflected the lowest scores. The REEL indicated developmental mean age change scores similar to those of the Alpern and Boll.

The results of the comparisons of various assessment measures are inconclusive. Perhaps it is best to adhere to the postulates of Muma and Muma (1979) who discuss the shift from psychometrics to descriptive procedures. They suggest that

> . . . behavior is made to conform to the psychometric model rather than the other way around. This of course makes the psychometric model vulnerable to distortion and misrepresentation of what is claimed to be measured. It is imperative that clinical assessment procedures preserve the natural integrity of behavior rather than distort and misrepresent (p. 7).

Restated, " . . . The probablility of a powerful and useful assessment is high when it is oriented on the naturally functioning systems of an individual . . . (Muma, 1978, p. 211)," or " . . . Performance should be the first object of study . . . " and " . . . The material for any conclusions will be the behavioral products of the child . . . (Moerk, 1977, p. 9)." The performance of the participants in this study demonstrated that handicapped children with observable language and communication delays in addition to other varying diagnoses and who are between the ages of eighteen months

and three years can learn to use signs and words within a functional and relevant language learning environment.

Sign Language and Symbolic Expression

Evident from this study, even with the limitations of its generalizability, relative mediating value can be attributed to the use of signs for the acquisition of symbolic expression. This conclusion is drawn with a consideration of literature previously reviewed. Brown (1977) advocated that signs could be learned more readily than vocal expressions, the iconicity of signs, which was found to agree with a concept of developmental age, i.e., lower developmental ages tend to restrict the amount of complex symbolic behavior. Further, considering that people may be primarily visual (Premack, 1970b), support for learning signs at lower developmental levels would occur with less difficulty than the development of speech. When Bilowsky and Share (1965) studied their Down's Syndrome subjects they found these children of lower developmental levels to be most proficient in the gestural subscales of the ITPA (Illinois Test of Psycholinguistic Ability), and when Reich (1978) studied a group of young retarded children, she found that their motoric recall of gestures was superior to their auditory recall.

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